424

DENIVATION FEATURES OF THE VICTORIA VALLEY DUNES: AN EARTH ANALOGUE FOR MORPHOLOGICAL INDICATORS OF SOLID WATER ON MARS

H.A. McGowan, D. Neil

The University of Queensland, Brisbane, Qld, Australia

The identification of sources of water on Mars will be critical to the successful exploration of the planet and the establishment of a permanent presence by humans. While the Martian polar ice caps contain up to 70% water by mass, the extreme climate of these regions means that they may not be suitable for habitation. As a result, other sites must be identified where access to water is possible. Recent evidence has emerged that suggests dunes bordering the northern polar region of Mars may contain 40-60 % water ice in the upper 1-2 m of sediment. In this paper, we present niveo-aeolian features observed in the sand dunes of the Victoria Valley, Antarctica. These dunes have long been considered an Earth analogue for those on Mars. These features include cornices of permafrosted sand in dune-crest deflation hollows, exposed erosion resistant frozen water and sand lenses, wet sand flows and seeps. We also report on the morphological characteristics of sand sink holes which form in chains above layers of buried, melting and/or sublimating snow. This process is apparently reliant on the melting of inter-grain ice bonds and subsequent formation of a dry mobile sand layer on the dune surface.

These micro-morphological features, associated with summertime denivation of the 5 to 10 m high Victoria Valley sand dunes, are too small to identify on air photographs, satellite imagery and LIDAR DEMS of these transverse barchanoid ridges. However, on Mars where sand dunes are 1 to 2 orders of magnitude larger, these features may be identifiable if solid water exists within them. Perhaps of greater importance, they may indicate the presence of buried palaeo-snow layers which have been preserved beneath the erosion-resistant permafrosted sand dunes on Mars. We believe that the formation and subsequent exposure of these snow layers is the primary cause of the denivation features present in the polar dunes of the Victoria Valley, Antarctica.